



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,588	03/31/2004	Michael A. Moser	16869Q-084600US	8426
20350	7590	01/11/2006	EXAMINER	
TOWNSEND AND TOWNSEND AND CREW, LLP			GLASS, ERICK DAVID	
TWO EMBARCADERO CENTER			ART UNIT	
EIGHTH FLOOR			PAPER NUMBER	
SAN FRANCISCO, CA 94111-3834			2837	

DATE MAILED: 01/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/816,588

Applicant(s)

MOSER ET AL.

Examiner

Patrick Miller

Art Unit

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 22-26 is/are rejected.
- 7) ☒ Claim(s) 14-21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11012004</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it contains extra wording below the descriptive portion. Correction is required. See MPEP § 608.01(b).
2. The disclosure is objected to because of the following informalities: see bullet(s) below. Appropriate correction is required.
 - Figures 1-4B use the terminology “conventional.” Since these drawings are labeled “Prior Art,” please change conventional to prior art.

Claim Objections

3. Claims 10 and 12-26 are objected to because of the following informalities: see bullet(s) below. Appropriate correction is required.
 - Claim 10 does not end with a period.
 - Claim 12 recites, “referred to as the motor supply node.” Delete this portion and simply name the “node” the motor supply node in the preceding line.
 - Claim 16 recites, “referred to as the motor supply node.” Delete this portion and name the “node” the motor supply node.
 - Claim 22 recites, “said control logic” (l. 7). Lack of antecedent basis for this term.
 - Claim 26 recites, “referred to as the selective isolation switching element.” Delete this portion and name the switching element the selective isolation switching element.
 - Claim 26 recites, “referred to as the motor supply node.” Delete this portion and name the intermediate node the motor supply node.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-11 and 22-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- Claim 1 recites, “configured to enter a regenerative braking state during normal operation.” The underlined terms seem contradictory. If the spindle motor is in a braking state, then the circuit is not operating normally unless normal operation means any operation excluding a malfunction. Please clarify.
 - Claim 8 recites, “a control circuit that operates at specified times during normal operation to...configure the spindle motor drive circuit to cease driving the spindle motor.” The underlined terms seem contradictory. If the spindle motor is in a braking state, then the circuit is not operating normally unless normal operation means any operation excluding a malfunction. Please clarify.
 - Claim 22 recites, “during normal operation...said control logic being configured to enter a regenerative braking state.” The underlined terms seem contradictory. If the spindle motor is in a braking state, then the circuit is not operating normally unless normal operation means any operation excluding a malfunction. Please clarify.
 - Claim 26 recites, “said control logic being configured to enter a regenerative braking state during normal operation.” The underlined terms seem contradictory. If the spindle

motor is in a braking state, then the circuit is not operating normally unless normal operation means any operation excluding a malfunction. Please clarify.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 4, 8, 9, 10, 12, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Menegoli (5,504,402).
- With respect to claim 1, Menegoli discloses disk drive control circuit having control logic (Fig. 2, logic is circuitry excluding the vcm and the spindle motor), wherein the control logic is configured to enter a regenerative braking state during normal operation where the switching elements are controlled to isolate the spindle from the first supply voltage supply node (Fig. 2, #s 102, 104, 106, 108, 110, 112, 122, 128, 124 are the switches and isolate the spindle motor from Vcc during regenerative braking) and cause regenerative braking of the spindle motor so that kinetic energy is converted to electrical power that is supplied to the head motor by virtue of inductance of one or more motor windings in the set (col. 2, ll. 47-63; “parking” is interpreted as a normal operation, and the back-emf is supplied to the vcm via by charging the capacitor 126 located at a second node; also, “any condition” implies that the system does not have to experience an abrupt or

unexpected loss of power, but, rather, the system could command a park condition when the user turns off the power switch; i.e., commanded park situation).

- With respect to claim 8, Menegoli discloses a control circuit for a disk drive comprising: a control circuit that operates at specified times during normal operation to cause the switching element to prevent current flow between the first voltage supply node and the motor supply node (Fig. 2, #s 102, 104, 106, 108, 110, 112, and 128 prevent current from flowing to node connecting 124, 126, 132 while the system is not commanded into a parking state); the control circuit configures the spindle drive motor to cease driving the spindle motor and allow the spindle motor to supply current to the motor supply node (col. 2, ll. 47-63; in a park condition, the spindle motor is not driven and back-emf is supplied to the vcm); and the control circuit configures the head motor drive circuit to energize the head motor with current flowing from the first voltage supply node and current supplied by the spindle motor (col. 2, ll. 47-63; with back-emf sent to the capacitor).
- With respect to claims 4 and 9, at least one of the switching elements is configured as a boost circuit to boost the back-emf (col. 2, ll. 55-61; “stepping up” or “kicked-up”).
- With respect to claim 10, the boost circuit operates during the normal braking state (col. 2, ll. 47-50; where “any condition” implies that the system does not have to experience an abrupt or unexpected loss of power, but, rather, the system could command a park condition when the user turns off the power switch; i.e., commanded park situation).
- With respect to claim 12, Menegoli discloses a circuit for controlling a spindle motor and a head motor comprising: first and second voltage supply nodes (Fig. 2, Vcc and node

after 122); a switching element coupled between the first supply node and the second supply node (Fig. 2, #122); a spindle motor drive circuit coupled between the motor supply node and the second voltage supply node (Fig. 2, #s 102, 104, 106, 108, 110, 112 between node after 122 and motor supply node, which is the node connecting #s 124, 126, 132); the spindle motor drive circuit has node for coupling to respective spindle connection nodes (Fig. 2, #s 102, 104, 106, 108, 110, 112 connected to #s 12, 14, and 16); a head motor drive circuit coupled between the motor supply node and the second voltage supply node, where the head motor drive circuit includes nodes for coupling to respective head motor connection nodes (Fig. 2, #128 between node connecting #s 124, 126, 132, and node after #122); a boost circuit coupled between the first voltage supply node and the motor supply node (col. 2, ll. 55-63; steps up the back-emf); a control circuit coupled to the switching element, the spindle motor drive circuit, the head motor drive circuit, and the boost circuit (Fig. 2, #100); the control circuit is configured with a set of one or more spindle motor drive states, where the switching element is set to allow current flow between the first voltage supply node and the motor supply node, the spindle motor drive circuit is configured to energize the spindle motor with current flowing between the motor supply node and the second voltage supply node, and the boost circuit is not activated; the control circuit being configured to set one or more regenerative braking states, where the switching element is set to prevent current flow between the first voltage supply node and the motor supply node, the spindle motor drive circuit allows the spindle motor to supply current to the motor supply node, the boost circuit is activated to allow current to flow from the first voltage supply node to the motor supply

node, and the head motor drive circuit energizes the head motor with current flowing from the first voltage supply node and the current supplied by the spindle motor (col. 2, ll. 47-63; in non-park mode, the system does not supply current to the vcm via the spindle motor's back-emf; therefore, no need to use the boost section. In park, the system turns off the spindle motor and supplies back-emf to the vcm via the "boost" section).

- With respect to claim 26, Menegoli discloses a disk drive comprising: a disk having concentric tracks for storing information; a head for reading and/or writing information to the disk (col. 3, ll. 50-59; read-write heads); a spindle motor having a set of windings for rotating the disk (Fig. 2, #18); a head motor for moving the head to access selected tracks (Fig. 2, #132); a spindle motor drive circuit (Fig. 2, #s 100, 102, 104, 106, 108, 110, 112); a head motor drive circuit (Fig. 2, #s 128, 126, 138); first and second voltage supply nodes for connection to a source of electrical power for the spindle motor and the head motor (Fig. 2, Vcc and node after 122); a selective isolation switching element coupled between the first supply node and a motor supply node (Fig. 2, #128 between node after 122 and node connecting #s 124, 126, 132), the spindle motor drive circuit and the head motor drive circuit being coupled between the motor supply node and the second supply node (Fig. 2, #s 102, 104, 106, 108, 110, 112, and 128 between node after 122 and node connecting #s 124, 126, 132); motor control logic coupled to the spindle motor drive circuit, the head motor drive circuit, and the selective isolation switching element (Fig. 2, #100), where the control logic enters a regenerative braking state during normal operation and where the selective switching element is controlled to isolate the spindle motor from the first supply voltage node, and the spindle motor drive circuit and the head

motor drive circuit are controlled to cause regenerative braking of the spindle motor so as to supply the head motor with electrical power (col. 2, ll. 47-63).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menegoli as applied to claim 1 above, and further in view of Suzuki (2004/0080858).
 - Menegoli discloses sensing a commanded power-down condition to put the system in the regenerative state (col. 2, ll. 47-50; “in any condition” implies that the system does not have to experience an abrupt or unexpected loss of power, but, rather, the system could command a park condition when the user turns off the power switch; i.e., commanded park situation), but does not disclose the recharging a battery in the regenerative state.
 - Suzuki discloses that a storage battery could include a capacitor ([0006]). The motivation to use a battery is because it can store more power than can a capacitor alone.
 - Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to add to the capacitor of Menegoli, as battery. Adding the battery allows the storage system to store more power, which provides the advantage of ensuring that there is enough power to fully retract or park the head when power is turned off.

Art Unit: 2837

7. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Menegoli as applied to claims 1 and 12 above, and further in view of Goretzki et al. (6,094,020).

- Menegoli does not disclose the limitations of claims 5 and 13.
- Goretzki et al. teaches entering the regenerative state for a seek operation (col. 5, ll. 29-56). The motivation to use the regenerative energy during a seek operation is to decrease the seek time.
- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to implement the regenerative state in Menegoli during a seek operation, thereby providing the advantage of reducing the seek time, as taught by Goretzki et al.

8. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menegoli (5,504,402).

- With respect to claim 22, Menegoli discloses a device use in a disk drive system comprising: circuitry that operates during normal condition so that the control logic controls the switching elements to provide electrical power to the spindle motor and the head motor from a voltage source coupled to first and second voltage supply nodes; the control logic enters a regenerative braking state during normal operation, wherein at least one of the switching elements is controlled to isolate the spindle motor from the first supply voltage node; and at least some of the switching elements are controlled to cause regenerative braking of the spindle motor so that kinetic energy is converted to electrical power that is supplied to the head motor by virtue of inductance of the motor windings (col. 2, ll. 47-63).

Art Unit: 2837

- Menegoli does not explicitly disclose a chip set having a plurality of switching elements incorporated in one or more semiconductor devices and an integrated circuit device having drive control circuitry. With respect to this feature, the examiner takes Official Notice. It is well known in the art and would have been obvious to one having ordinary skill in the art at the time of the invention to implement the control circuitry for driving the spindle motor and the voice coil motor in a chip set having the claims limitations (semiconductor devices and integrated circuit device). The motivation to use a chip set is because this allows for a standardized package that functions, as claimed, to be used in a disk drive unit. This provides the advantage of increasing manufacturing efficiency. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to implement the control and drive circuitry of Menegoli into a chipset, thereby providing the advantage of increasing efficiency of manufacturing disk drive units. See also the non-patent literature submitted by the applicants.

9. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Menegoli as applied to claim 22 above.

- Menegoli does not disclose the limitations of claims 24 and 25. With respect to these features, the examiner takes Official Notice. It is well known and would have been obvious to one having ordinary skill in the art at the time of the invention that the switching elements could be incorporated either in a single semiconductor chip or more than one semiconductor chip. The motivation to choose single or plural chips is a design choice. Choosing one chip provides at least the advantage of likely occupying less space than would two chips because the interconnection circuitry between the two chips is not

needed. Choosing more than one chips provides at least the advantage of being able to replace only a particular unit should a relatively minor component malfunction in that particular unit. This would save costs because of not having to replace all of the switching units.

Allowable Subject Matter

10. Claims 16-21 would be allowable once the minor informalities are corrected.

- The Prior Art does not disclose the specific interconnections of the various circuits/elements with respect to the nodes.

11. Claims 3, 6, 7, 11, 14, 15, and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

- With respect to claims 3 and 23, the Prior Art discloses entering a regenerative state when a spindle motor speed drops below a certain threshold. However, the Prior Art does not disclose preventing a regenerative state when a sensed motor speed falls outside a desired range.
- With respect to claims 6 and 14, the Prior Art does not disclose the control logic configured to enter a regenerative braking state for at least some of said commutation states, and the control logic entering respective regenerative braking states for each of a contiguous sequence of commutation states.
- With respect to claims 7 and 15, the Prior Art does not disclose the control logic configured to enter a regenerative braking state for at least some of said commutation

states, and the control logic entering respective regenerative braking states for each of a non-contiguous sequence of commutation states.

- With respect to claim 11, the Prior Art discloses synchronous boost circuits comprising an inductor and at least one switching element. However, the Prior Art does not suggest motivation to implement such a boost circuit into a device with the limitations of claims 8 and 9.

12. Additionally, claims 3, 6, 7, 11, and 23 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

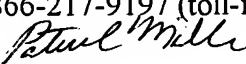
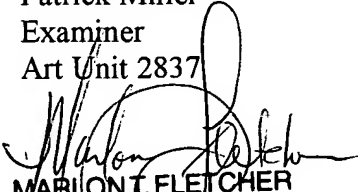
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick Miller whose telephone number is 571-272-2070. The examiner can normally be reached on M-F, 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on 571-272-2800 ext 41. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pm
December 27, 2005


Patrick Miller
Examiner
Art Unit 2837

MARLON T. FLETCHER
PRIMARY EXAMINER